BEFORE THE
PUBLIC SERVICE COMMISSION OF
SOUTH CAROLINA
DOCKET NO. 2010-3-E

In the Matter of Annual Review of Base Rates for Fuel Costs for Duke Energy Carolinas, LLC	)))))	**DIRECT TESTIMONY OF THOMAS C. GEER FOR DUKE ENERGY CAROLINAS, LLC**

Q. PLEASE STATE YOUR NAME, ADDRESS, AND POSITION.

A. My name is Thomas C. Geer. My business address is 526 South Church Street, Charlotte, North Carolina. I am Vice President of Nuclear Engineering for Duke Energy Carolinas, LLC ("Duke Energy Carolinas" or the "Company").

Q. WHAT ARE YOUR PRESENT RESPONSIBILITIES AT DUKE ENERGY CAROLINAS?

A. As Vice President of Nuclear Engineering, I am responsible for corporate engineering support of our nuclear fleet including fuel management, reactor core design, nuclear safety analysis, reload analysis methods, nuclear technical services, and nuclear fuel procurement.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I graduated from Texas A&M University with Bachelor of Science and Master of Science degrees in Nuclear Engineering. I began my career at Duke Energy Corporation (formerly Duke Power Company) in 1982 and have held a variety of technical and leadership roles with both Duke Energy Carolinas and Duke Engineering and Services, Inc., including positions at McGuire and Catawba nuclear stations, the Yucca Mountain Project in Nevada, and the Hanford Tank Farms near Richland, Washington. I assumed my current role in 2004. I am a registered professional engineer in the states of North Carolina and South Carolina.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to (1) provide information regarding the Company's nuclear fuel purchasing practices, (2) provide costs for the June 2009 through May 2010 review period, and (3) describe changes forthcoming in the October 2010 through September 2011 billing period.

Q. YOUR TESTIMONY INCLUDES 2 EXHIBITS. WERE THESE EXHIBITS PREPARED BY YOU OR AT YOUR DIRECTION AND UNDER YOUR SUPERVISION?

A. Yes. These exhibits were prepared at my direction and under my supervision, and consist of Geer Exhibit 1 (The Nuclear Fuel Cycle), which is a graphical representation of the nuclear fuel cycle, and Geer Exhibit 2 (Nuclear Fuel Procurement Practices).

Q. PLEASE DESCRIBE THE COMPONENTS THAT MAKE UP NUCLEAR FUEL.

A. In order to prepare uranium for use in a nuclear reactor, it must be processed from an ore to a ceramic fuel pellet. This process is commonly broken into four distinct industrial stages: 1) mining and milling; 2) conversion; 3) enrichment; and 4) fabrication. This process is illustrated graphically in Geer Exhibit 1.

Uranium is often mined by either surface (*i.e.*, open cut) or underground mining techniques, depending on the depth of the ore deposit. The ore is then sent to a mill where it is crushed and ground-up before the uranium is extracted by leaching, the process in which either a strong acid or alkaline solution is used to dissolve the uranium. Once dried, the uranium oxide ("U_3O_8") concentrate – often referred to as yellowcake – is packed in drums for transport to a conversion facility. Alternatively, uranium may be mined by in situ leach ("ISL") in which oxygenated groundwater is circulated through a very porous ore body to dissolve the uranium and bring it to the surface. ISL may also use slightly acidic or alkaline solutions to keep the uranium in solution. The uranium is then recovered from the solution in a mill to produce U_3O_8.

After milling, the U_3O_8 must be chemically converted into uranium hexafluoride ("UF_6"). This intermediate stage is known as conversion, and it produces the feedstock required in the isotopic separation process.

Naturally occurring uranium primarily consists of two isotopes, 0.7% U-235 and 99.3% U-238. Most of this country's nuclear reactors (including those of the Company) require U-235 concentrations in the 3-5% range to operate a complete cycle of 18 to 24 months between refueling outages. The process of increasing the concentration of U-235 is known as enrichment. The two commercially available enrichment processes, gaseous diffusion and gas centrifuge, first heat the UF_6 to create a gas. Then, using the mass differences between the uranium isotopes, the natural uranium is separated into two gas streams, one being enriched to the desired level of U-235, known as low enriched uranium, and the other being depleted in U-235, known as tails.

Once the UF_6 is enriched to the desired level, it is converted to uranium dioxide ("UO_2") powder and formed into pellets. This process, and the subsequent steps of inserting the fuel pellets into fuel rods and bundling the rods into fuel assemblies for use in nuclear reactors, is referred to as fabrication. For McGuire and Catawba, new fuel assembly orders by the Company in the billing period are planned for cycle lengths of approximately 18 months. For Oconee, new fuel assembly orders by the Company are planned during the billing period to support the transition from cycle lengths of 18 months to approximately 24 months. The length of a cycle is the duration of time between when a unit starts up after refueling and when it starts up after its next refueling.

For fuel batches recently loaded into Duke Energy Carolinas' reactors, uranium concentrates have represented approximately 30% of the total direct fuel cost. The cost of conversion services, enrichment services, and fabrication services have represented approximately 5%, 45%, and 20%, respectively. The Company expects that the uranium concentrates component will increase its relative percentage of total direct fuel cost in the future due to the recent market price increases experienced in this sector relative to historical norms.

Q. PLEASE PROVIDE A SUMMARY OF DUKE ENERGY CAROLINAS' NUCLEAR FUEL PROCUREMENT PRACTICES.

A. As set forth in Geer Exhibit 2, Duke Energy Carolinas' nuclear fuel procurement practices involve computing near and long-term consumption forecasts, establishing nuclear system inventory levels, projecting required annual fuel purchases, qualifying suppliers, requesting proposals, negotiating a portfolio of spot and long-term contracts from diverse sources of supply, assessing spot market opportunities, and monitoring deliveries against contract commitments. For uranium concentrates, conversion, and enrichment services, Duke Energy Carolinas relies extensively on long-term contracts to cover the largest portion of its forward requirements. By staggering long-term contracts over time for these components of the nuclear fuel cycle, the Company's purchases within a given year consist of a blend of contract prices negotiated at different periods in the markets, which has the effect of reducing the Company's exposure to price volatility. Diversifying fuel suppliers reduces the Company's exposure to possible disruptions from any single source of supply. Due to the technical complexities of changing fabrication services suppliers, Duke Energy Carolinas generally sources these services to a single domestic supplier on a plant-by-plant basis using multi-year contracts.

Q. WHAT CHANGES HAVE OCCURRED IN THE COST OF THE VARIOUS STAGES OF NUCLEAR FUEL DURING THE REVIEW PERIOD?

A. At the same time the spot market price of uranium concentrates increased to a record high of $138.00/lb in June 2007, the long-term market price for uranium increased to a record high of $95.00/lb. Since then, both the spot and long-term market prices have declined, ~70% and ~40% respectively. During the review period, the spot market price oscillated in the $40 to $55/lb range before ending the period at $41.75/lb. In that same period, long-term market price declined from $65.00/lb to $58.00/lb. The Company's average unit cost of uranium concentrates during the review period was $40.36/lb, an increase from the average cost of $19.48/lb in the prior review period.

Industry consultants believe uranium market prices need to remain high in comparison to historic norms in order to provide the economic incentive for the exploration, mine construction, and production necessary to support future industry uranium requirements.

For enrichment, the spot market price has almost doubled since the lows experienced in calendar year 2000 while the long-term market price has increased more than 45% since it was first published in August, 2004. The spot market price was $163.00/Separative Work Unit ("SWU") at the beginning of the review period and decreased to $153.00/SWU by the end of the period. In the same period, the long-term price has declined $6 to $157.00/SWU. One hundred percent of the Company's enrichment purchases during the review period were delivered under long-term contracts negotiated at lower market prices prior to the review period. This mitigated the impact of higher market prices on the Company during the review period. The average unit cost of the Company's purchases of enrichment services during the review period was $105.63/SWU, a slight decrease as compared to the $107.33/SWU during the previous review period and still notably less than market prices in the same period. As existing enrichment contracts in the Company's portfolio expire, they will be replaced with contracts that are anticipated to contain higher delivery prices. These higher prices will be reflected in future periods as fuel assemblies using such enrichment are fabricated and loaded into the Company's reactors.

Market prices for fabrication services have begun to increase in recent years. The most significant impact to the unit cost of fabrication services purchased in the review period occurred as a result of contract amendments the Company executed to ensure delivery of reliable fuel designs for Oconee, McGuire, and Catawba nuclear stations. These amendments contributed to an increase of approximately 12% to the average unit cost of the Company's fabrication supply during the review period as compared to the previous review period.

Although the unit cost of the Company's purchases of conversion slightly decreased from $7.79/kilogram Uranium ("kgU") as UF_6 in the prior review period to $7.42/kgU as UF_6 during the review period, these costs have a limited impact on the overall fuel expense rate given that the dollar amounts for these purchases represent a relatively minor portion of the Company's total direct fuel cost.

Q. WHAT CHANGES DO YOU EXPECT IN THE COMPANY'S NUCLEAR FUEL COSTS IN THE BILLING PERIOD?

A. Duke Energy Carolinas anticipates an increase in nuclear fuel expense through the billing period. Because fuel is typically expensed over two to three operating cycles – roughly three to five years – Duke Energy Carolinas' nuclear fuel expense for the billing period will be determined by the cost of fuel assemblies loaded into the reactors during the review period, as well as prior periods. Much of the fuel residing in the reactors during the billing period was obtained under contracts negotiated prior to the recent market price increases. However, newer contracts reflecting increasing price trends are now contributing to a portion of the uranium, enrichment, and fabrication costs reflected in the total fuel expense. In addition, the ongoing transition to a new design with significantly improved reliability at Oconee will increase fuel requirements and costs because the new design is less efficient from a uranium utilization perspective.

As a result, the average fuel expense is expected to increase from 0.48 cents per kilowatt hour ("kWh"), incurred in the review period, to approximately 0.56 cents per kWh in the billing period. As fuel with a low cost basis is discharged from the reactor and lower priced legacy contracts continue to expire, nuclear fuel expense is anticipated to experience further increases in the future.

Q. WHAT STEPS IS THE COMPANY TAKING TO PROVIDE STABILITY IN ITS NUCLEAR FUEL COSTS AND TO MITIGATE AGAINST PRICE INCREASES IN THE VARIOUS COMPONENTS OF NUCLEAR FUEL?

A. As I discussed earlier and as described in Geer Exhibit 2, for uranium concentrates, conversion, and enrichment services, Duke Energy Carolinas relies extensively on staggered long-term contracts to cover the largest portion of its forward requirements. By staggering long-term contracts over time, the Company's purchases within a given year consist of a blend of contract prices negotiated at many different periods in the markets, which has the effect of smoothing out the Company's exposure to price volatility.

The effectiveness of the above strategy depends on the willingness of fuel suppliers to offer certain pricing mechanisms under long-term contracts, *e.g.*, fixed prices, base escalated prices, or caps on market index prices. The Company found that during periods in which the uranium spot market prices were rapidly increasing (*e.g.*, 2003 through 2007), suppliers became reluctant to offer these pricing mechanisms. Instead, uranium suppliers offered contracts with delivery prices tied to future market prices with no ceiling price and very high floor prices. As a result, the Company adjusted its strategy by purchasing uranium in the spot market and holding it to meet future requirements. As uranium prices have decreased from the peak market price in 2007, suppliers are beginning to again offer reasonable pricing terms under long-term contracts, which provide improved opportunities to obtain supplies under long-term contracts.

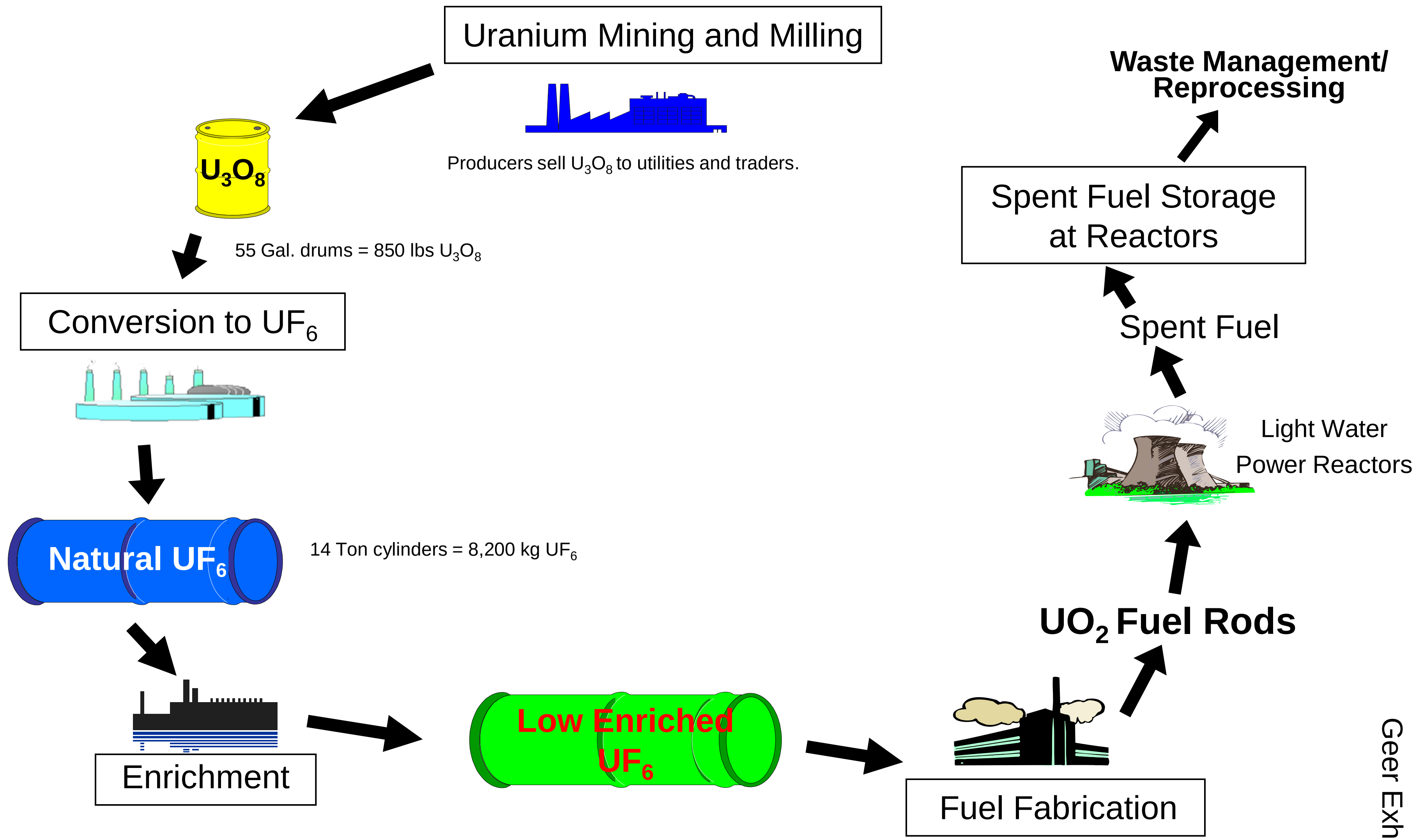
The Company is also working with its fuel vendors to develop alternative fuel assembly design options that offer improved uranium utilization without sacrificing reliability. These are long-term projects, however, as the typical product development time for a major fuel assembly design change can range from eight to ten years to allow for adequate design development, laboratory testing, and in-reactor verification of the design. Such improved designs would be expected to help mitigate increases in uranium and enrichment costs in future years.

Although costs of certain components of nuclear fuel are expected to increase in future years, nuclear fuel costs on a cents per kWh basis will likely continue to be a fraction of the cents per kWh cost of fossil fuel. Therefore, customers will continue to benefit from the Company's diverse generation mix and the strong performance of its nuclear fleet through lower fuel costs than would otherwise be the case absent the significant contribution of nuclear generation to meeting customers' demands.

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes, it does.

The Nuclear Fuel Cycle



Geer Exhibit 1

Duke Energy Carolinas Nuclear Fuel Procurement Practices

The Company's nuclear fuel procurement practices are summarized below.

- Near and long-term consumption forecasts are computed based on factors such as: nuclear system operational projections given fleet outage/maintenance schedules, adequate fuel cycle design margins to key safety licensing limitations, and economic tradeoffs between required volumes of uranium and enrichment necessary to produce the required volume of enriched uranium.
- Nuclear system inventory targets are determined and designed to provide: reliability, insulation from short-term market volatility, and sensitivity to evolving market conditions. Inventories are monitored on an ongoing basis.
- On an ongoing basis, existing purchase commitments are compared with consumption and inventory requirements to ascertain additional needs.
- Qualified suppliers are invited to make proposals to satisfy additional or future contract needs.
- Contracts are awarded based on the most attractive evaluated offer, considering factors such as price, reliability, flexibility and supply source diversification/portfolio security of supply.
- For uranium concentrates, conversion and enrichment services, long term supply contracts are relied upon to fulfill the largest portion of forward requirements. By staggering long-term contracts over time, the Company's purchases within a given year consist of a blend of contract prices negotiated at many different periods in the markets, which has the effect of smoothing out the Company's exposure to price volatility. Due to the technical complexities of changing suppliers, fabrication services are generally sourced to a single domestic supplier on a plant-by-plant basis using multi-year contracts.
- Spot market opportunities are evaluated from time to time to supplement long-term contract supplies as appropriate based on comparison to other supply options.
- Delivered volumes of nuclear fuel products and services are monitored against contract commitments. The quality and volume of deliveries are confirmed by the delivery facility to which Duke Energy Carolinas has instructed delivery. Payments for such delivered volumes are made after Duke Energy Carolinas' receipt of such delivery facility confirmations.